

Railway Shop Up To Date

Chapter XI.

STOREHOUSE

THE development of a large number of small railways into a comparatively small number of large railway systems has emphasized the importance of having an extensive base of supplies as a factor in the efficient and economical operation of the large system. The necessity of such a base has resulted in a well organized department in charge of the care and distribution of supplies and material, and the work of such organizations has done much toward decreasing operating expenses and providing for the prompt delivery of material.

As a result of the necessity of having a base of supplies, the general storehouse has been developed. It is usually situated at the principal center of the railway system and in connection with the general shop plant. The store department is now very commonly under the jurisdiction of a general storekeeper with headquarters at the point at which the general storehouse is located. From this point distribution is made to other points where local storehouses are maintained and supplies are delivered to the several departments.

A number of spacious, well designed storehouses have been constructed in connection with recent shop plants and proper facilities have been provided for sorting and delivering material, not only in the storehouse proper but also in the storage yards, which are now considered adjuncts of the general storehouse. There are several striking examples of railway shop managements working in close accord with the stores department, which illustrate the desirable results to be obtained by such co-operation. All new and manufactured material is received under the jurisdiction of the general storehouse and is stored, delivered and disbursed by this department.

The development of good facilities and the effective methods which have been introduced are due largely to the efforts of the Railway Storekeepers' Association. The indications are that much more is to be accomplished and doubtless future store departments will bear further evidence of the work of this association.

While the storehouse is an individual building the department which it governs contributes to nearly every part of the shop plant. Due to the size of much of the material used, it is impossible to store all material in the storehouse or on the platform adjoining the storehouse. Even if it were possible to store all the material in the storehouse, such a method would be impractical because of the additional cost entailed by the second or third handling of material. At a large shop, therefore, storage space is provided close to each building in which a large amount of material is assembled. This arranges

for the storage of lumber, bar iron, boiler plate, flues, pipes, heavy castings, car wheels, tires, axles, truck frames, bolsters, etc. To handle this material economically requires outdoor traveling cranes, portable boom cranes, general yard tracks, as well as industrial track systems.

A very effective innovation in storehouse practice is the establishment of sub-stores in the several shops. In these sub-stores are kept material pertaining to the particular shop served which may be quickly replenished from the main storehouse. The economical feature of this method is that no time is lost by the workmen. All deliveries are made by representatives of the store department, and there is no excuse for a man to leave his work on the plea of going for material.

A diversity of opinion exists as to the advisability of establishing sub-stores about the plant, as the claim is made by some that the additional force required to look after them, together with the liability of excess of stock, more than offsets the expense of delivering material from the general storehouse to the different departments by special messenger.

The modern storehouse includes an up-to-date building and adjoining platform, together with large storage areas near the individual shop buildings, to take care of all material without crowding, as well as modern facilities for handling material. It also provides for system in the arrangement of material. Material is divided into sections according to class, in order that a laborer sent after a desired article can make no mistake in its selection, and in order that an inventory may be taken at the end of each month of all material in stock, without increasing the operating expenses or without increasing the cost of handling. Such system in providing for careful inventory at regular periods is an essential feature in assisting the store department to order intelligently and to keep stock down to a consistent minimum.

The orderly arrangement of material according to class calls for proper storage facilities in the yards as well as in the house. For instance, racks for standing boiler plate on edge to facilitate handling and to economize space; racks near the freight car erecting shop for storing and separating frame rods; bins for classifying castings; special boxes for classifying and stacking bolts, nuts, washers, etc.; iron storage racks and houses; proper shelving and pigeon holes to suit the various classes of small material, etc. An essential feature worthy of attention is a small compartment, carefully enclosed, for the storage of brass parts, which are frequently stolen if not thoroughly protected.

LOCATION.

As a general base of supplies for an entire railway system the location of the storehouse at the shop plant at which it is situated is such as to provide for good shipping facilities in order to expedite the rapid loading of cars for outside points. This requires good connections with the general yard system of tracks and with the outside lead. In some cases there is a single track on each side of the storehouse, in others there is a track on one side only, and in still others there are two tracks on each side.

While the storehouse may serve the entire system, or a single division, at the same time it is the center of distribution for the shop plant of which it forms a part. Its location to meet local requirements should be near the center of the plant and between the locomotive and car departments. There is usually a string of cars on one or both sides of the storehouse and more or less movement of these cars before or after loading and unloading. Where the storehouse is located centrally these cars offer some impediment to the distribution of material and movement between shop buildings.

In many shops of recent design, careful attention has been given to so arranging the individual shop buildings as to provide for intercommunication, and this arrangement is being improved by placing the principal buildings tributary to a general thoroughfare or avenue of shop traffic. Where this principle is followed, the storehouse is usually at one end of the thoroughfare and at one side of the area occupied by the shop buildings. According to this scheme track connections to the storehouse are convenient and the general thoroughfare provides for distribution to the locomotive and car departments with equal facility. In this respect there is a certain similarity between the general layout plan of the large shops recently constructed, in which the principal buildings are tributary to a crane served midway, and that of the smaller shops in which the principal buildings are tributary to a single transfer table. In one, the storehouse is at the end of the midway and in the other it is at the end of the transfer table pit.

This feature is exemplified rather strikingly by the illustrations presented in connection with the chapter on the railway shop layout, selected as representative of a number of practical shop arrangements.

At Burnside, I. C. R. R., and at Collinwood, L. S. & M. S. Ry., the storehouse is between the locomotive and car departments. At Silvis, C. R. I. & P. Ry., the car department has not yet been built, however, the storehouse is so located as to be between the present site of the locomotive department and the site selected for the car department.

At Angus, C. P. Ry.; Beech Grove, C. C. C. & St. L. Ry.; Battle Creek, Grand Trunk Ry., and at Scranton, D. L. & W. Ry., shops at which the principal buildings are arranged tributary to a crane served

midway, the storehouse is adjacent to this thoroughfare and at or near the edge of the property covered by shop buildings.

At Denver, C. & S. Ry.; Hannibal, C. B. & Q. Ry.; Oelwein, C. G. W. Ry., and at Fond du Lac, Wis. Cent. Ry., where the principal buildings are tributary to a single transfer table, and at South Louisville, L. & N. R. R., where the principal buildings are tributary to a single transfer table and a crane served storage yard, making an L-shaped thoroughfare, the storehouse is located at one end of the transfer table pit.

BUILDING.

The storehouse is usually in an isolated building where there is ample room for track approach and for surrounding the building, partially or in whole, with a storage and unloading platform. In more recent years this principle has been adhered to almost without exception in building new shops. However, there are a number of shops now in service in which the storehouse is a part of the main building or has walls in common with some of the other buildings. At Oelwein, C. G. W. Ry., the storehouse is at one end of the main building, and the storehouse at Reading, P. & R. R. R., is between the boiler shop and blacksmith shop, having walls common with both.

The nature of the service performed by the storehouse requires a large amount of loading and unloading. It is therefore essential that provision be made for a number of cars to stand at the storehouse at one time and that trucking across the house shall cover a short distance. For this reason the storehouse is a long narrow building.

For greater facility in loading and unloading cars the first floor of the storehouse is usually 4 feet above grade or at the level of an ordinary box car floor. A platform usually extends along one or both sides of the first floor; and this platform is normally unobstructed in order to facilitate rapid trucking between the storehouse and cars. At each end there is usually a platform for the storage of such material as may be exposed to the weather without serious deterioration.

In view of the large amount of material which may be exposed to the weather and yet should be stored near the storehouse where it may be properly supervised, the tendency is for a wider platform along the sides of the building to serve as a storage space as well as a loading platform. Many store department officials consider 14 feet as the minimum width advisable, and a platform 18 feet wide is favored.

At Angus, C. P. Ry., the track approach and loading platform are at one side only of the storehouse. Doors on the other side are used for the receipt of material delivered by teams. As the storehouse at Reading is not isolated it is impossible to provide track approaches at either side, and the delivery track is brought in through the center of the building.

While the storehouse at Sayre, L. V. R. R., is isolated and has a track approach on each side, a delivery track is brought in through the center of the building. As the floor and platform are at the height of a car floor, the middle track causes a pit through the center. Access between the two sections thus formed is by means of adjustable bridges which are swung in the clear when cars are to be moved. The floor of the storehouse at McKees Rocks, P. & L. E. R. R., is on the ground level. This is flanked on each side by a depressed track and the cars are thus lowered to a convenient height.

The storehouse is usually a substantial building with brick walls in which the roof and upper floors are supported by a wooden structure of slow-burning construction. It is characteristic of modern storehouses that they are well provided with ample natural light.

There is quite a difference in the number and arrangement of floors at various storehouses. For instance, at Silvis, C. & N. W. Ry., there are three floors, all above ground level. The floors are served by two electric elevators of 5,000 lbs. capacity each. At Collinwood, L. S. & M. S. Ry., the number and arrangement of floors are the same, and the three floors are served by a single elevator of 5,000 lbs. capacity. The general storehouse at Burnside, I. C. R. R., has two floors above ground level in addition to a basement. The basement and two upper floors are served by an hydraulic elevator of 10,000 lbs. capacity, and in addition to this the basement is served by two hydraulic elevators of 10,000 lbs. capacity, each, which deliver direct to the shipping platforms along the sides of the building. The basement extends beneath the area covered by the side platforms, and thus has the advantage of this greater area in addition to that covered by the building proper.

The storehouse at Angus, C. P. Ry., is of one story, with the exception of a gallery for the storage of light material, which covers about two-thirds of the floor area. The gallery is reached by a single staircase and the clerical force of the stores department occupies offices at one end of the gallery.

A number of storehouses are of one story throughout, or of one story with a basement, and it is quite common to build the main portion of the storehouse of one story, with two or three stories at one end which are occupied by the storekeeper, the master mechanic and their respective office staffs.

While the storehouse at Angus covers a greater actual ground area than any other storehouse of which information is at hand, the storehouse at Silvis has the greatest storage space, due to the greater number of available floors. The Angus storehouse is 600 feet long by 85 feet wide, covering a ground area of 51,000 square feet, and providing a storage area of approximately 80,000 square feet. The Silvis storehouse is 500 feet long by 100 wide, covering a ground area of 50,000 square feet, and providing a storage area of 134,312

square feet, arranged with 47,712 square feet on the first floor and 43,300 square feet on each of the second and third floors. The clear heights above the first floor of the Silvis storehouse is about 18 feet, above the second floor about 14 feet, and above the third floor an average of a little over 9 feet. The Burnside general storehouse is 300 feet long by 70 feet wide, covering a ground area of 21,000 square feet and providing a storage space of 61,600 square feet. In addition to this there is a new storehouse at Burnside which takes care of road department supplies, etc., and is 400 feet long by 72 feet wide, a portion 150 feet long being two stories high. The two storehouses cover a ground area of 50,400 square feet and provide a total storage area of 104,400 square feet. The storehouse at Collinwood is 302 feet long by 60 feet wide, covering a ground area of 18,000 square feet and providing a total storage space of 54,000 square feet. The one-story storehouse of the Lehigh Valley Railroad at Sayre is 363 feet long by 102 feet wide and provides a storage space of 37,400 square feet.

INTERIOR ARRANGEMENT.

The interior arrangement of the storehouse with regard to the distribution of storage shelves, cases, racks, etc., like so many features of a railway shop plan, depends on local conditions. The conditions peculiar to this case are the shape and size of building, location of windows or skylights providing natural light, and the number of floors in the storehouse.

The shelves and bins are commonly arranged in large sections and the sections so placed as to form long aisles extending the entire length of the building to provide for the delivery and distribution of material. A feature of importance almost equal to that of providing for unimpeded delivery is the arrangement of sections to allow the unobstructed diffusion of natural light. Another essential feature is the arrangement of aisles and sections so that the officer in charge of the storehouse may obtain a view covering a large area from one vantage point.

The experience of a number of different storehouses would lead to the conclusion that where the building is a long narrow structure of a single story and natural light is almost wholly admitted through skylights in the roof, the most satisfactory arrangement of shelves and bins is in long rows parallel with the length of the building, with aisles between for trucking and distribution. With such an arrangement the entire floor is well lighted naturally and is subjected to easy observation from an office at one end of the floor. Further, the capacity of the floor is well utilized for storage space.

Where the floor is entirely dependent upon windows in the wall for natural lighting, the cross arrangement of shelves seems to give the best results, longitudinal aisles being provided for trucking and distribution. Some storehouse authorities maintain that all windows in the walls should be at least 10 or

12 feet above the floor line to allow the wall space to be utilized for bins, shelves, etc.

The windows in the side walls of the storehouse at Angus, C. P. Ry., are 12 feet above the floor in order that storage shelves may be arranged along these walls and yet allow generous natural light. In addition to those shelves at the side are sections of shelves arranged transversely. Four longitudinal aisles traverse the area occupied by the shelves, one in front of each side row and two passing through the cross sections. There are no dark or dusty corners in this building, and anyone walking along the aisles has a clear and unobstructed view of the alley ways between the racks.

The Angus storehouse is divided into three sections separated by fire walls and fireproof doors. The sections are designated as A, B and C. Section A occupies the end of the building nearer the locomotive shop and is used for the storage of material common to the locomotive department. For similar reasons car material is kept in Section C. Section B is called the shipping section and through it is handled current material for the line. This section is provided with three receiving and three distributing doors. There is a scale and office at each door and all material entering and leaving the storehouse is weighed and checked.

The individual sections and shelves at most railway storehouses are usually built of wood and designed according to the requirements of local conditions and for the specific material to be stored. The portion constituting the base is usually wider than the upper portion and is of the same width for a height of about three feet. Above this the shelves usually taper toward the top, and the wider portion of the base section provides a narrow platform on which to stand in reaching the upper shelves. The upper pigeon holes are usually small and the spaces become wider and higher until they approach the bottom.

The shelves and furnishings are necessarily provided in ample quantity and suitably designed to accommodate the great variety that constitutes the stock. It has been customary to accomplish this result by erecting permanent shelves and racks. In view of the number of changes that take place in the movement and rearrangement of stock, it has been suggested as desirable to equip store rooms with shelves and racks that could be extended, contracted or relocated without loss or inconvenience. This result may be accomplished to a great extent by adopting what is known as the unit system, that is, to build storehouse furniture in units, and of a size that would render them portable and interchangeable. While the outside dimensions of these units must be uniform they should be of various designs, suited for the different classes for which they are required. The unit idea of construction finds its most conspicuous exemplification in the elastic book cases which are now being largely manufactured and sold.

Units suitable for storehouse practice have been built of $\frac{7}{8}$ inch pine, 26 inches high, 52 inches long and 16 inches deep outside. These can be subdivided into sections as required. The sections should be raised a suitable distance from the floor, which may be done by resting them on a base built of 2 by 6 inch stock. A moulding may be placed on the top to give them a more finished appearance, but this is not necessary. As many units may be assembled as required and as space permits.

CRANE SERVICE.

At those shop plants so arranged as to make the principal buildings tributary to a single crane served thoroughfare, a portion of the storehouse platform is usually within the span of the crane to provide for handling and delivering heavy material.

At Silvis, C., R. I. & P. Ry., a large platform 400 feet long and 134 feet wide, for the storage of heavy material, is served by a traveling crane of 5 tons' capacity, having a span of 80 feet. A delivery track along one side of the platform is within the scope of this crane.

At the Chicago & Northwestern Railway shops at Chicago and at the Burnside shops of the Illinois Central Railroad, traveling cranes have been installed in the storage yards, to facilitate the movement of material and the loading and unloading of cars.

At Collinwood, L. S. & M. S. Ry., a large area which occupies a space between two rows of the principal buildings is soon to be served by an outdoor traveling crane and will be used as a storage yard for heavy material.

While the idea of handling storehouse material by a crane in the yard is not new, such a device facilitates the movement of material to a large extent and provides a feature of economy especially in handling very heavy material kept in stock, such as cylinders, driving wheel centers, tires, frogs, boiler fronts, boiler sheets, pilots, etc.

An interesting instance in this connection is the crane designed and constructed to meet local requirements at the Chicago shops of the Chicago & Northwestern Railway. This crane has a span of 45 feet and the runway supported on wooden frames covers a distance of 475 feet. The crane has a capacity of 5 tons and the motors are driven by current taken from the shop power house. As an instance of the economy represented by the installation of this crane, it is interesting to observe that, with the assistance of the crane, two men now do the work formerly requiring ten men.

SCRAP.

With very little exception all scrap that accumulates on a railway system has a market value and it is therefore of the utmost importance that scrap material should be taken care of and delivered to the proper department with as little loss of time as possible. It is now generally conceded that scrap should be handled by the store department and on most railways this practice is followed.

At the 1905 convention of the Railway Storekeepers' Association, an excellent paper on the subject of scrap, scrap handling and credit, was presented by Mr. W. G.

Tubby, general storekeeper of the Great Northern Railway. This paper described a system of handling scrap by which such satisfactory results have been obtained that it is believed representative of up to date practice and the paper is reproduced in part as follows:

"On the Great Northern system all scrap is approximately turned over to the store department as soon as made, or as soon after as convenient, and the proper accounts credited with the value of same; so that all scrap on the entire system is cleaned up each month. Maintenance of way scrap that has accumulated at the section tool houses during the month is picked up by the supply cars.

"All scrap brass is delivered to the storehouse by the mechanical department, with credit ticket made out as fast as it accumulates, and credited to the proper account. On receipt of the scrap brass at the storehouse it is weighed, graded and put in the bins assigned for same, which bins are located in the storehouse under lock and key.

"The heavy scrap from the machine shop, and all from the blacksmith and boiler shops, is loaded on cars specially assigned for scrap service at the shops as it accumulates. Credit tickets are made out and turned over to the store department, who have the cars switched to the scrap bins to be unloaded, sorted and graded, and the scrap received is checked against the credit tickets turned in, so that all scrap is credited to the accounts for the month in which it belongs. In this way there is no scrap left scattered around the shops or grounds.

"By locating the west end of the scrap bins convenient to the door of the machine shop, all turnings and borings and all scrap that can be handled by push car or wheelbarrow is delivered by the mechanical department to the scrap bins with credit tickets daily, and only the large scrap, such as wheel centers, cylinders, etc., are loaded on scrap cars assigned for that purpose. But all scrap from the boiler and blacksmith shops is loaded on scrap cars and delivered to bins for sorting and grading. This is both a convenient and economical arrangement.

"At smaller shops all scrap is delivered to the store department daily and credit tickets to the proper accounts turned in on delivery. At locomotive round-houses and car repairing yards the scrap is delivered to the storehouse bins with credit tickets at the time requisitions are made for new material, so that the man who delivers scrap to the storehouse sees it weighed and takes the new material back with him.

"In the case of car repairing yards being located too far from the storehouse to deliver the scrap as removed, it is allowed to accumulate until a certain date each month, when it is weighed and loaded on cars and turned over to the store department with credit tickets; but in all other cases all scrap is delivered to the storehouse at the time new material is drawn. Scrap journal bearings, however, are delivered at the storehouse at the time new journal bear-

ings are drawn, so that there is always a scrap bearing received when issuing a new one.

"All maintenance of way scrap, with the exception of rail, is delivered to the supply cars when making their monthly trips at the time the new supplies are delivered. The scrap which has accumulated on the sections during the month is assembled at the tool houses from time to time, and the section men educated to sort out the different kinds, so that on arrival of the supply cars the different kinds of scrap are quickly weighed and loaded and credit tickets made out in duplicate, and O. K'd by the section foremen and supply car man, the original being sent to the division superintendent for his information to invoice against the store department for the amount and value of the scrap turned over to the supply cars, and the duplicate is sent to the storekeeper to check against the scrap received on the car when it arrives, and also to check against the superintendent's invoices when received. In this way there is no confusion or misunderstanding. The store department receives the scrap and accepts the superintendent's invoices for same.

"When the supply cars collect a load of scrap they bill the car to the storehouse from which they are operated, and another empty car is used. All track scrap, including frogs, crossings, split switches, switch stands, hand and push cars, tools, etc., in fact, all scrap, with the exception of rail, is cleaned up each month and loaded on the cars which accompany the supply cars delivering the monthly supplies. In this way all the scrap on the system is shipped to the stores each month with the exception of scrap rail, this being loaded by division superintendents as often as convenient.

"In order to get the best results in handling scrap, it is essential that all concerned be educated to the fact that the different parts must be separated, the usable from what is actually scrap, and the cast or malleable from steel, wrought, etc., as each kind of scrap has a different market value, and also that all scrap must be turned over to the store department as soon as possible and credited to the proper accounts. Also, the store department insisting on old tools and other material being turned in, so far as can be done, at the time new material is issued. By this method all scrap is in the hands of the store department, practically, as soon as it accumulates, when it is sorted, graded and the usable material separated and put into stock for further service, and the scrap sold at the option of the purchasing agent.

"It has been explained how scrap is delivered to the store department, but the question of handling the scrap after being received, in order to produce the best results at the least possible expense, which includes sorting out second-hand usable material, and material that can be repaired at a cost that would warrant doing so, in preference to scrapping, is a very important one.

"In the first place, a thoroughly competent foreman who has a good knowledge of the different kinds of usable material and its use, and the grades of scrap, should be assigned in charge of the scrap bins, also steady and intelligent laborers assigned him; and these men should not be taken off the work so long as there is work to do, as they only become efficient by long experience. It is also advisable and economical to pay one or more of the old experienced men a few cents per day higher rate than the other laborers with whom they are working, in order that they may be relied upon to retain their positions and watch the other men and see that usable material is not being scrapped, or scrap not correctly graded, which latter is of great importance when loading on sales orders.

"To handle scrap economically a proper system of scrap bins should be provided, the floor of the bins being on a level with the deck of cars, and the bins of sufficient capacity to meet all requirements. Scrap bins which the Great Northern Railway use at their new Dale street shops are giving entire satisfaction, being convenient, economical and ample in every sense of the word. The bins are 600 feet long by 38 feet wide, which includes a platform on one side 8 feet wide on which is located a standard-gauge track for the operation of push cars which are used in moving the different kinds of scrap for delivery to the proper bins. On this platform, in front of the bins, are two track scales on which to weigh the scrap loaded on push cars, which is a convenient and economical arrangement. All cars containing scrap from shops or shipped in from different points on the line is unloaded on push cars on this platform for delivery to the bins after being weighed.

"On the opposite side there is no platform, but a track is located where cars are placed at the bins for loading scrap on sales orders. By having no platform on the sales side, there is no lost ground to travel over in loading scrap into the cars, as would be the case if scrap was loaded on the sorting side. The tracks on each side of the scrap bins lead together at the ends. At the east end they lead to the track scales, where all empty and loaded cars are weighed. This prevents delay while switching, as if switching is being made on the scale's side the men can be moved over to the sorting side and continue at work until the cars are placed for them to resume loading. Or, if the cars are on the sorting side being switched, the men can be used in loading, or moved over to the main storehouse, which is only a few feet distant, the scrap bins being located parallel to the main storehouse, and connections made at each end by swing bridges which can easily be turned by one man, and thereby kept at work at all times while switching is being done. The west end of the scrap bins is opposite to, and only a few feet distant from, the door of the machine shop, with turntable at end of incline track from platform, so that scrap can be loaded on push cars and run over to the incline, turned, weighed

on the platform track scales, and delivered to the bins in which the scrap is to be placed.

"At each end of the scrap bins a number of bins have been roofed over, and in these bins are stored the different kinds of borings and turnings, No. 1 and No. 2 wrought, foundry coke, sand and ashes, scrap hose, rope and sacking, and other scrap which should be under cover; the balance of the bins are uncovered.

"In connection with the economical handling of scrap I would not recommend contract labor unloading, sorting and grading of scrap at a price per ton, for the reason that there is so much good second-hand, or material that can be replaced cheaply, which would be liable to be scrapped if paid for at a contract price, the principal thing the contractor would have in view being the tonnage; and I consider the best and most economical results can be obtained by having a thoroughly competent, conscientious foreman in charge of the scrap yard, who knows his business, so that no material but what is actually worthless would be scrapped.

"The railway scrap pile furnishes an interesting and instructive object lesson; for there you find the remains of the material that has been purchased new and put into service by the different departments in the operation and maintenance of the road, for by studying the breakages, the weakness and defects of the material taken out of service are located, and if necessary a remedy is provided.

"The system of handling scrap on the Great Northern Railway and the results secured have been highly satisfactory, especially so from an economical standpoint, since the new scrap bins at the general stores, St. Paul, have been put into commission."

OIL HOUSE.

At a large or general railway shop plant the oil house is usually a small, fireproof building isolated from the other buildings. At small shop plants a section of the storehouse is frequently devoted to the storage and delivery of oil and waste.

LOCATION.

Where oil is handled through the storehouse the location of the oil handling department is naturally dependent upon the situation of the storehouse. That portion of the storehouse devoted to this department is selected to provide convenience in the delivery of oil to the roundhouse and the shop buildings.

The location of the isolated oil house is dependent upon several conditions. Its natural location is near the storehouse, and at the same time it should be in a situation convenient to the several shops operating machinery. Where a roundhouse is included in the shop plant, it is very essential that the oil house should be in close proximity to the roundhouse in view of the large amount of oil delivered to supply locomotives.

The location of the oil houses at Burnside, I. C. R. R., and at Silvis, C., R. I. & P. Ry., repre-

sents a convenient method of disposing of this building. In each case the oil house is reached by the platform serving the storehouse, and while not directly between the storehouse and the roundhouse, it is located conveniently with regard to both of them, and is also accessible from the other buildings. At Elizabethport, C. R. R. of N. J., the roundhouse is not near the storehouse and there are several buildings between them. At this point the oil house is isolated and is near the roundhouse. At the same time it is easy of access from the locomotive shop.

BUILDING.

The oil house usually consists of one floor and a basement and the floor is commonly four feet above grade, on the level of an ordinary car floor. The walls are usually of brick supported on concrete foundations and the roof is supported by steel roof trusses or by a wooden framework of slow-burning mill construction. The basement is arranged to contain oil storage tanks, and a convenient method of arranging the main floor is to divide it into three sections, a shipping room, a barrel room and a waste room. The rooms are separated by fire walls having fireproof sliding doors. The basement and main floor are connected by a steel stairway.

The oil house is commonly heated by steam pipes and those pipes in the basement are carried along the wall or between the tanks. Steam pipes placed in the tanks are unsatisfactory because of their liability to leak and their inaccessibility for repairs.

DELIVERY.

The most convenient method of delivery to the storage tanks is by gravity from a tank car placed on an adjacent track or by gravity from barrels placed immediately over the storage tanks. While these methods have not been followed always they represent the most common practice.

Delivery from the tanks is generally made at some one convenient point. The faucets through which de-

livery is made are assembled and are connected by pipe lines with the several tanks.

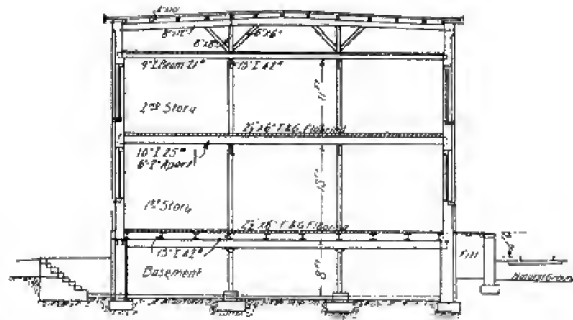
Oil is raised to the point of delivery either by compressed air or by pumps, and in some cases both air and pumps are installed. Water entrained in the air pipes is apt to become mixed with the oil, and due to its deteriorating effect upon illuminating oils, these oils are usually delivered by pumps.

In order that the storage tanks shall not be kept under air pressure, oil is led by gravity into a small reservoir which is properly equipped with check valves and air connections. The oil is then delivered by compressed air from the reservoirs through the pipe lines to the faucets, air control valves being situated conveniently near the faucets.

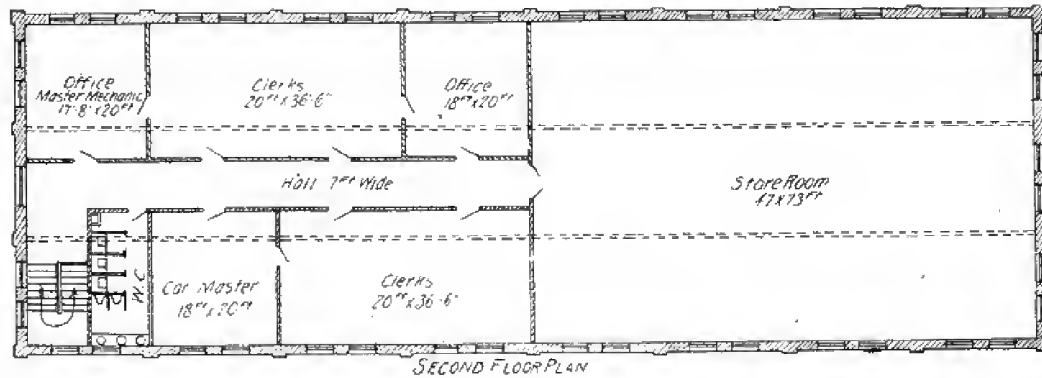
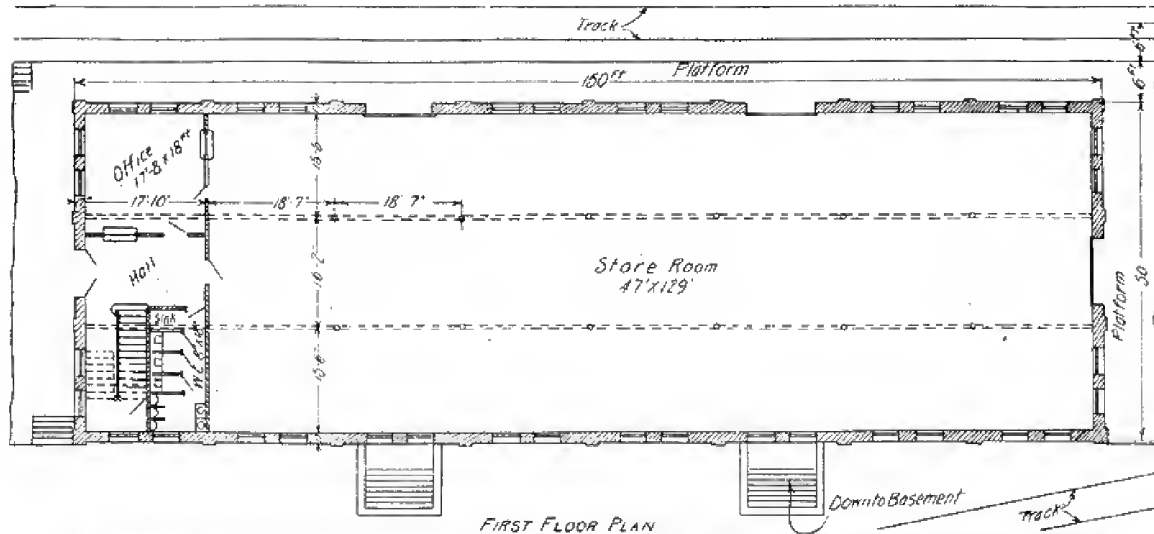
An ingenious system of oil delivery has been developed whereby oil is delivered from the storage tanks by pumps which may be set to measure the desired amount and deliver accurately only the amount required. This system not only represents a saving in handling oils but further serves to provide an accurate measure of the oil which has been removed, by which may be determined the amount of oil remaining.

A further convenience of this system is that the storage tanks are not necessarily in the same building as the delivery pumps. For instance, at the Collinwood roundhouse of the L. S. & M. S. Railway, as well as at some other points, the storage tanks are in the basement of an isolated oil house, while the pumps controlling the delivery of oil are in the small store room connected with the roundhouse. The pumps occupy a small space so that they do not crowd the store room and they do not present an unsightly appearance.

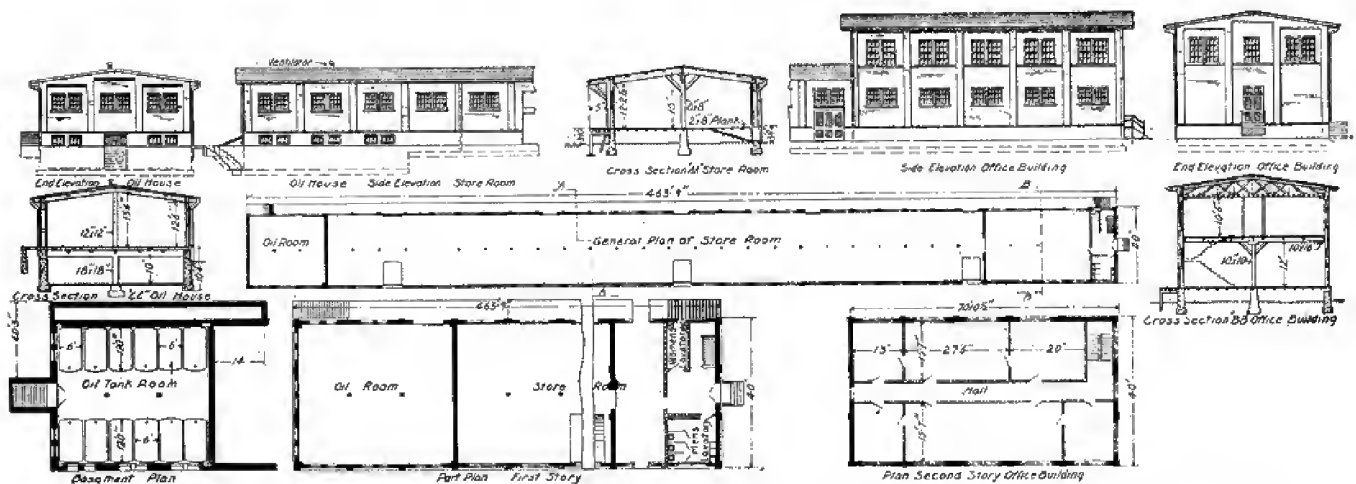
The engravings presented with this chapter illustrate designs and dimensions of a number of representative oil houses as well as several systems of storing and delivering oil.



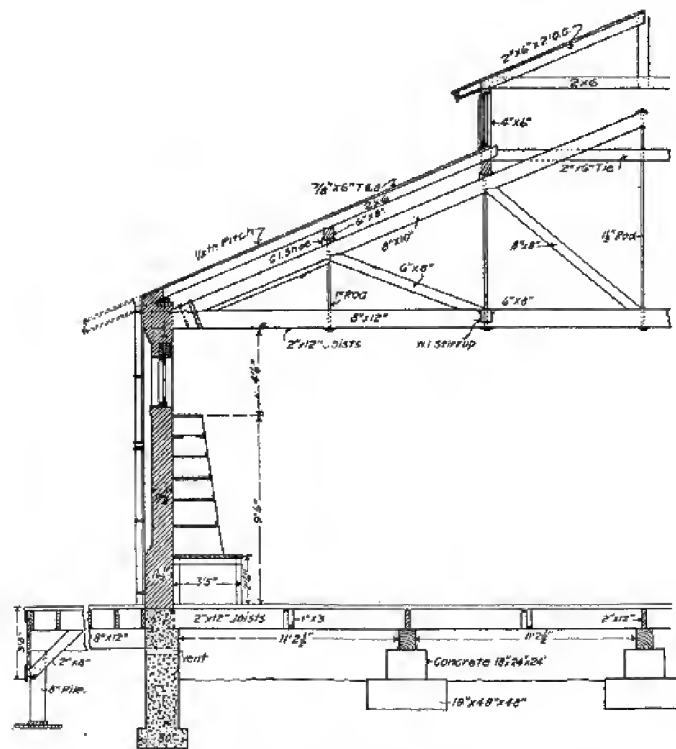
CROSS SECTION THROUGH OFFICE BUILDING AND GENERAL
STOREHOUSE AT BARING CROSS, ARK.
ST. L. I. M. & S. RY.



PLAN OF OFFICE BUILDING AND STOREHOUSE AT BARING CROSS, ARK., ST. L. I. M. & S. RY.



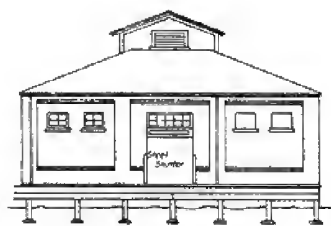
PLANS AND ELEVATION OF STOREHOUSE AND OFFICE BUILDING AT EAST DECATUR, ILL., WABASH RY.



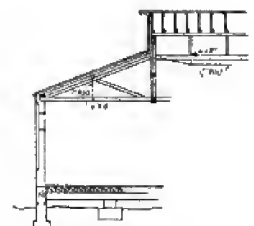
PARTIAL SECTION OF STOREHOUSE AT LA JUNTA,
COLO., A. T. & S. F. RY.



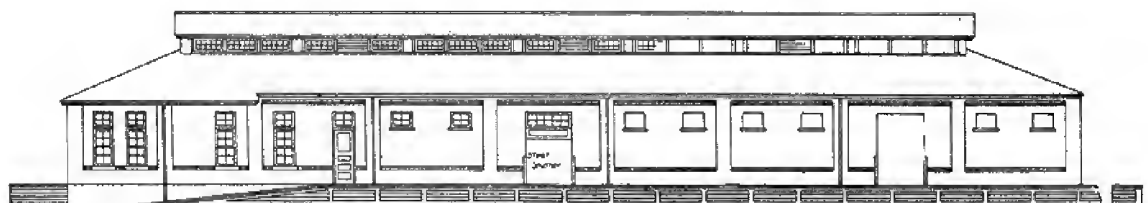
East Elevation



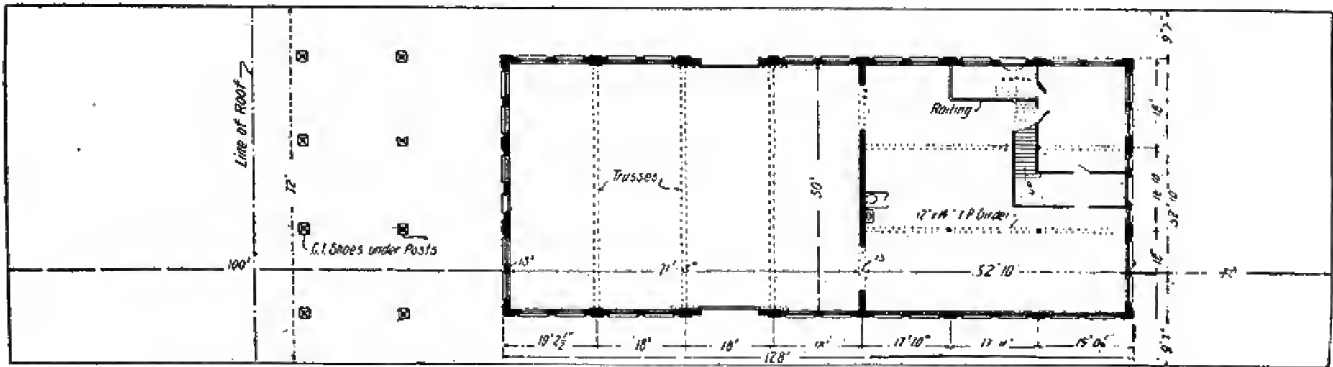
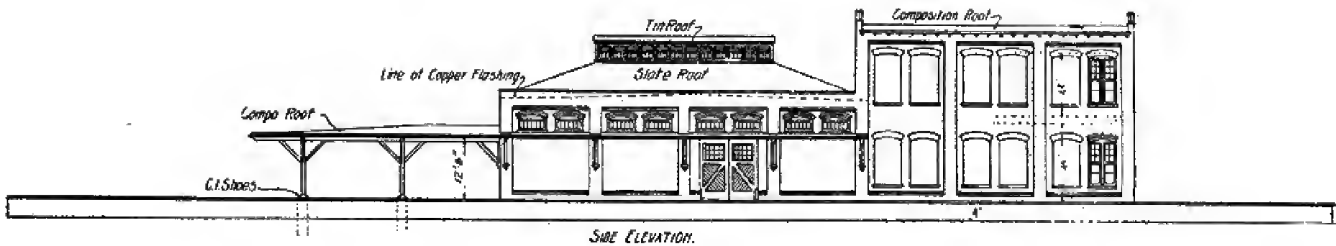
West Elevation.



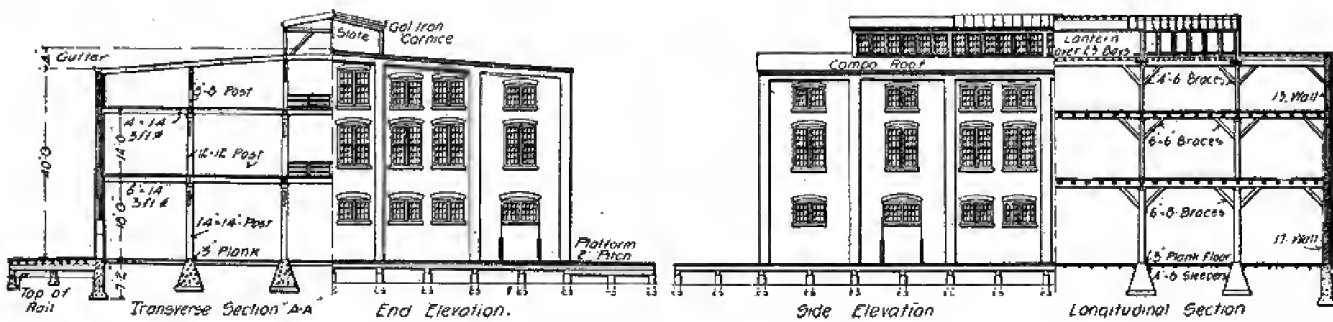
Section at West End



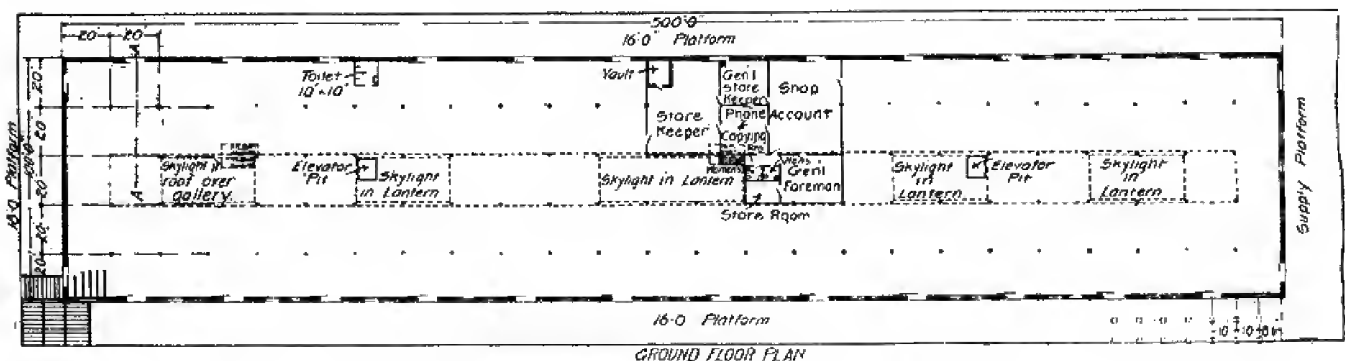
ELEVATIONS AND PARTIAL SECTION OF STOREHOUSE AT LA JUNTA, COLO., A. T. & S. F. RY.



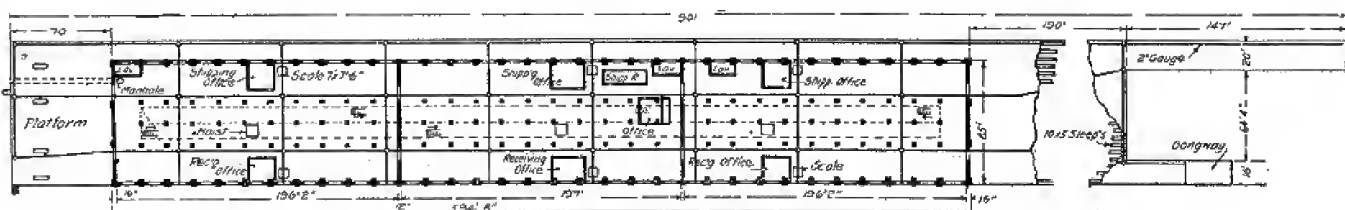
PLAN AND ELEVATION OF STOREHOUSE AND OFFICE BUILDING AT EAST ST. LOUIS, ILL., T. R. R.
ASSOCIATION OF ST. LOUIS.



SECTION AND ELEVATION OF STOREHOUSE AT SILVIS, ILL., C. R. I. & P. RY.

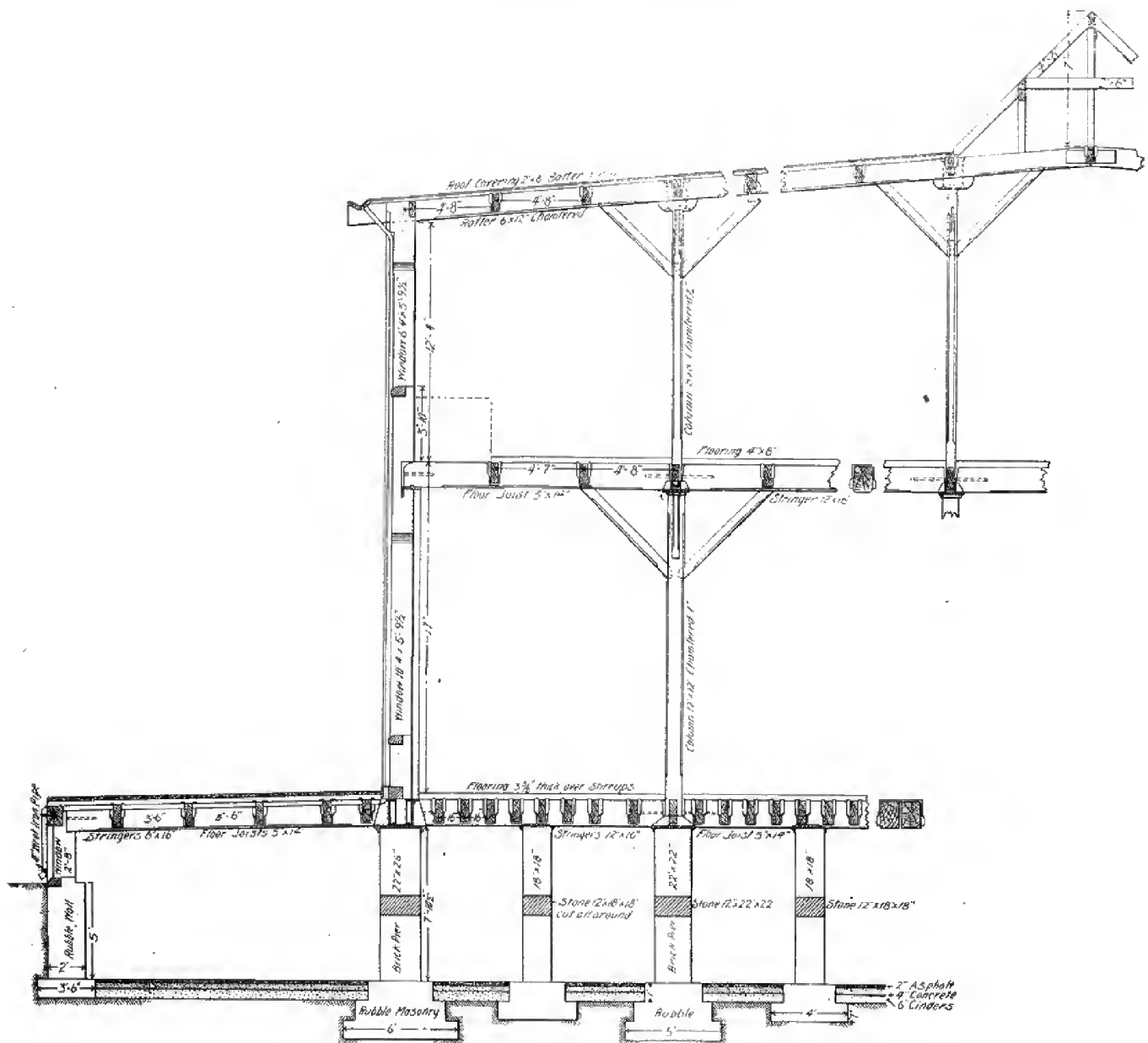


PLAN OF STOREHOUSE AT SILVIS, ILL., C. R. I. & P. RY.

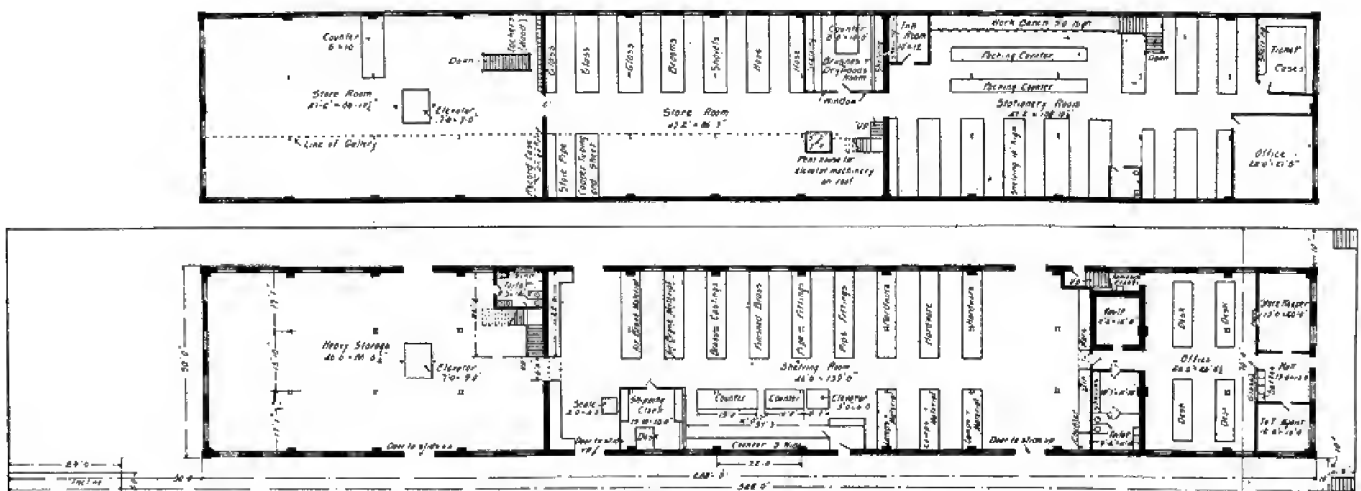


PLAN OF STOREHOUSE AT ANGUS, C. P. RY.

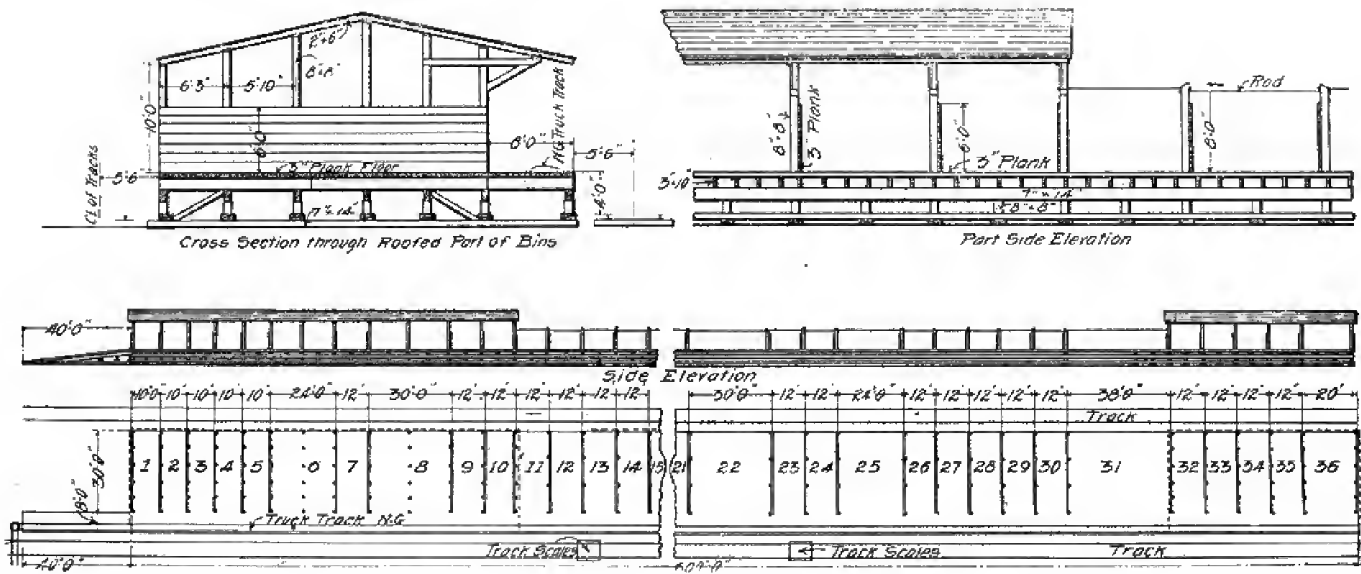
RAILWAY SHOP UP TO DATE



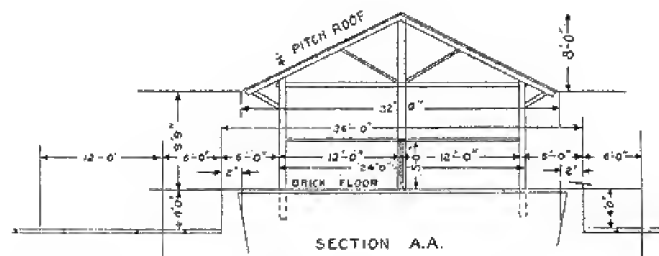
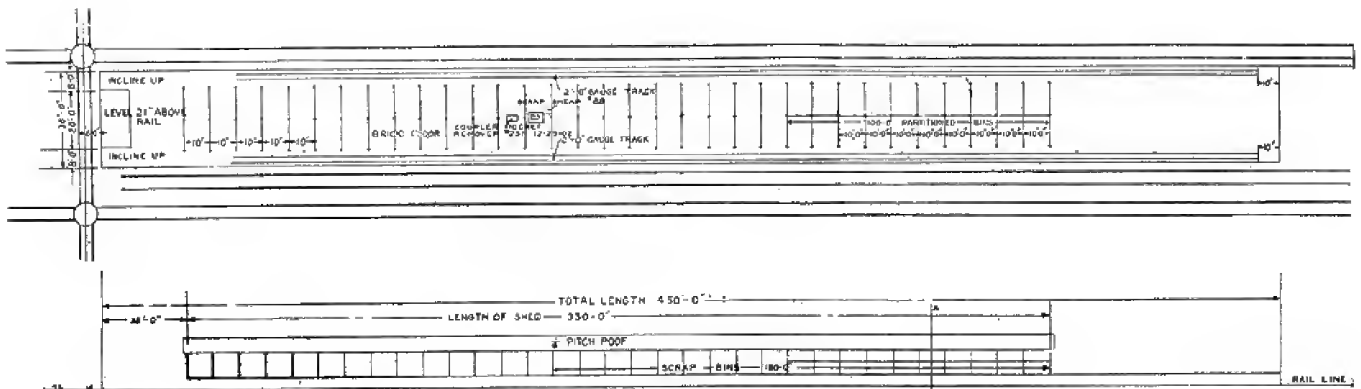
PARTIAL CROSS SECTION OF GENERAL STOREHOUSE AT BURNSIDE, ILL., I. C. R. R.

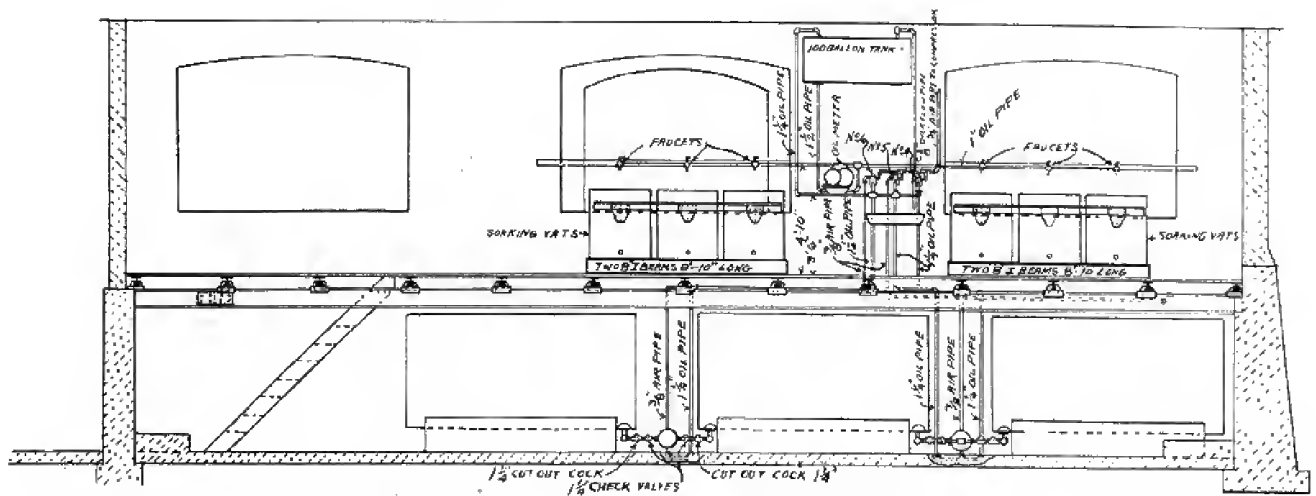


PLAN OF STOREHOUSE AND STATIONERY DEPARTMENT AT OMAHA, NEB., U. P. RY.

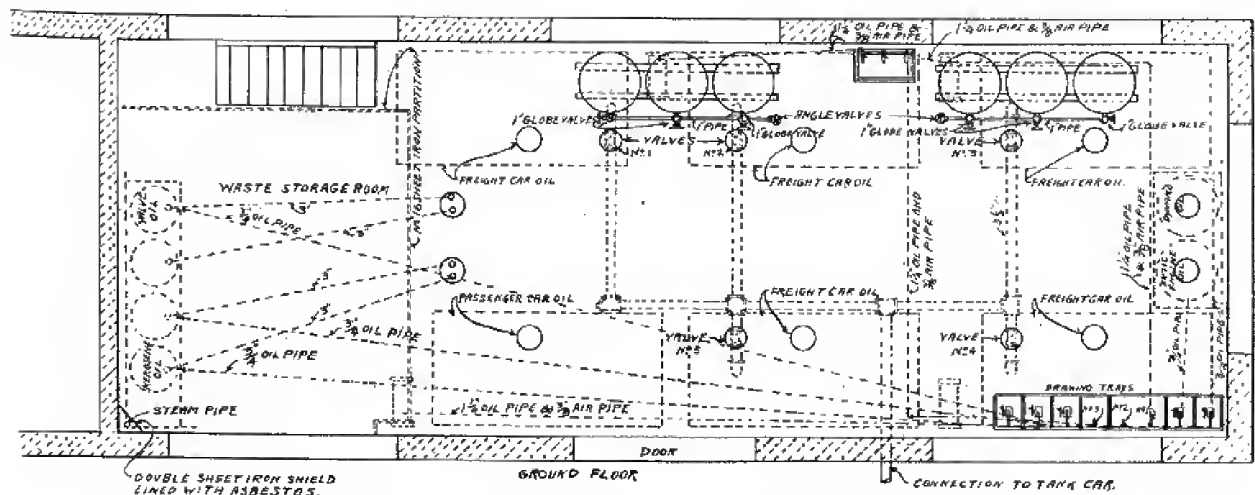


SCRAP PLATFORM AT DALE ST., ST. PAUL SHOPS, OF THE GREAT NORTHERN RY.

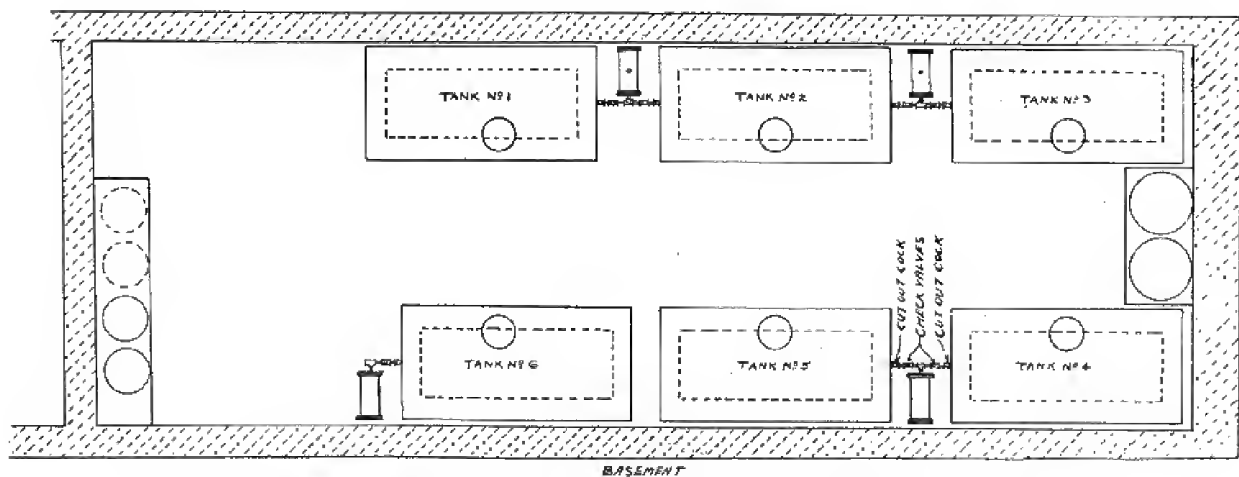
SECTION OF SCRAP PLATFORM AT COLLINWOOD SHOPS,
OF L. S. & M. S. RY.



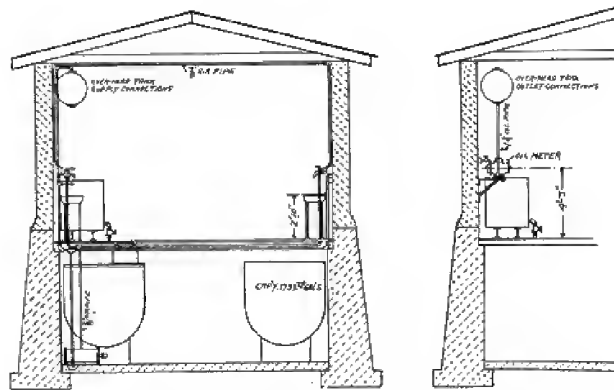
LONGITUDINAL SECTION OF OIL HOUSE AT SCRANTON CAR SHOPS, D. L. & W. R. R.



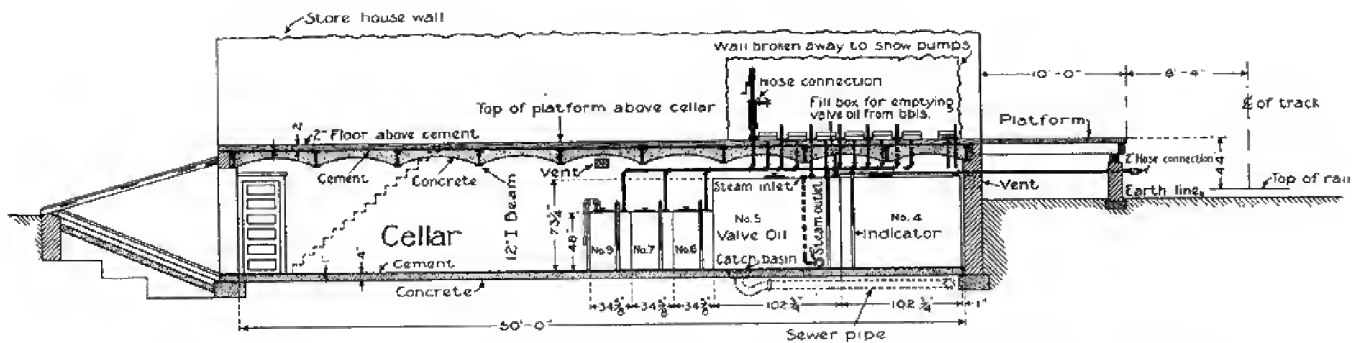
PLAN OF GROUND FLOOR OF OIL HOUSE AT SCRANTON CAR SHOPS, D. L. & W. R. R.



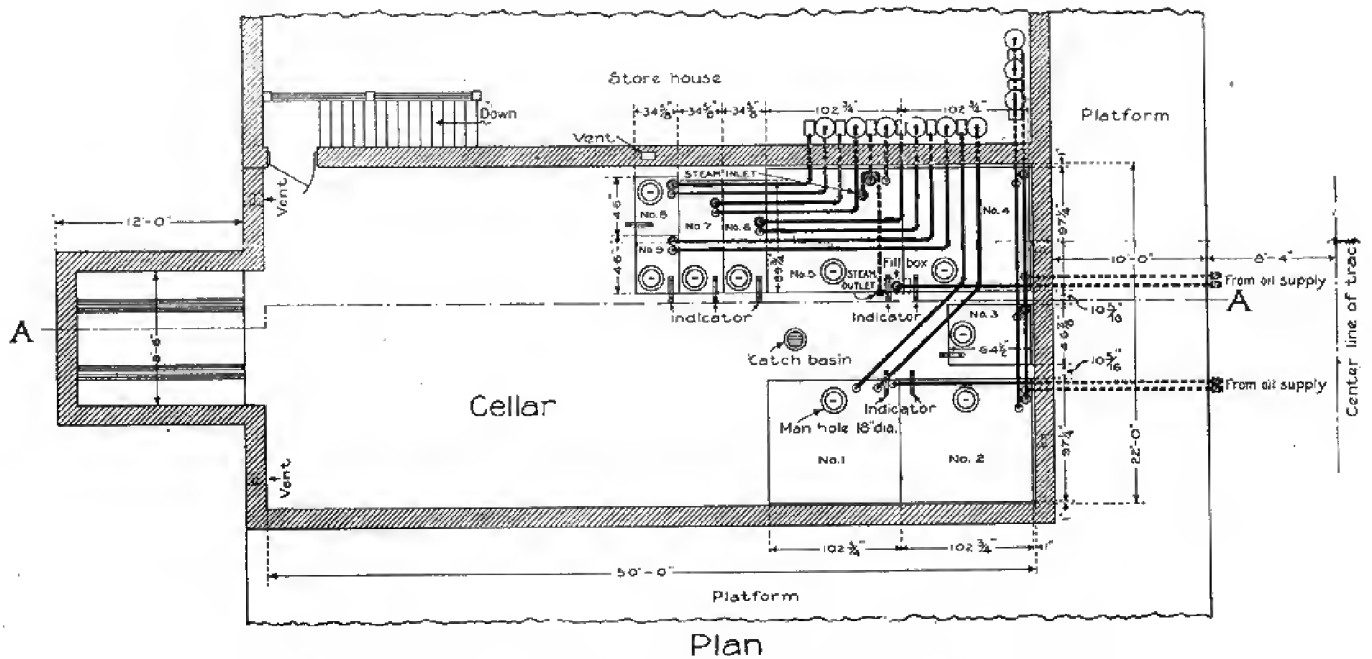
PLAN OF BASEMENT OF OIL HOUSE AT SCRANTON CAR SHOPS, D. L. & W. R. R.



CROSS SECTION OF OIL HOUSE AT SCRANTON CAR SHOPS,
D. L. & W. R. R.

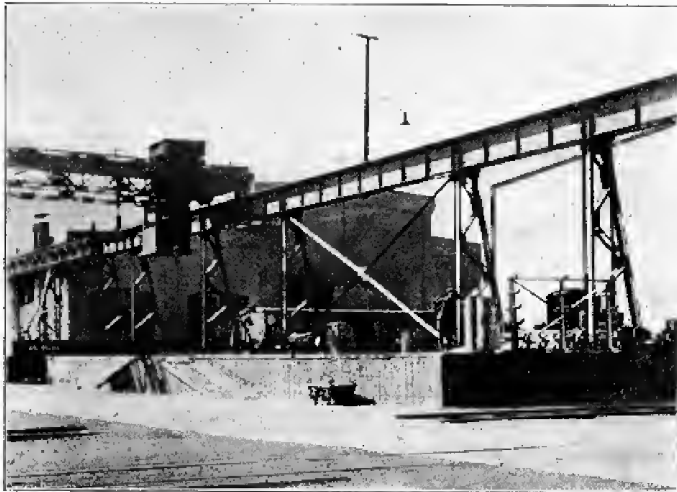


CROSS SECTION OF OIL DEPARTMENT OF STOREHOUSE AT SHOPTON, IA., A. T. & S. F. RY.



Plan

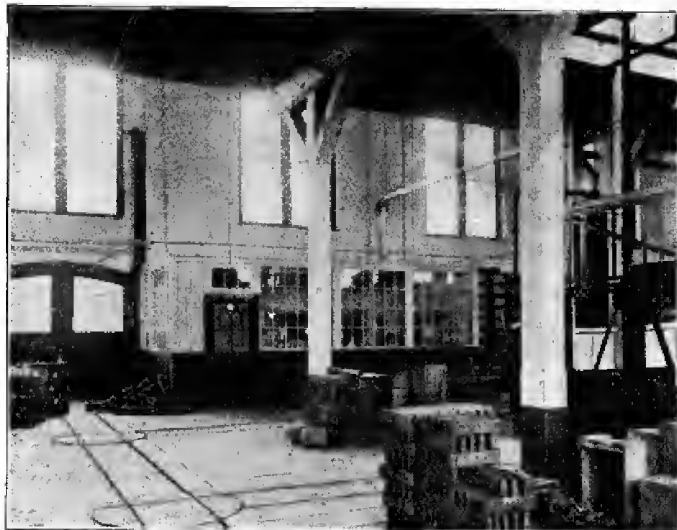
PLAN OF OIL DEPARTMENT OF STOREHOUSE AT SHOPTON, I A., A. T. & S. F. RY.



PORTION OF STOREHOUSE PLATFORM SERVED BY MID-WAY CRANE, ANGUS SHOPS, C. P. RY.



CRANE SERVED THOROUGHFARE, OR MIDWAY, STANDARD GAUGE AND INDUSTRIAL TRACK AND CAR AT LEFT; PORTION OF STOREHOUSE PLATFORM AT RIGHT, ANGUS SHOPS, C. P. RY.



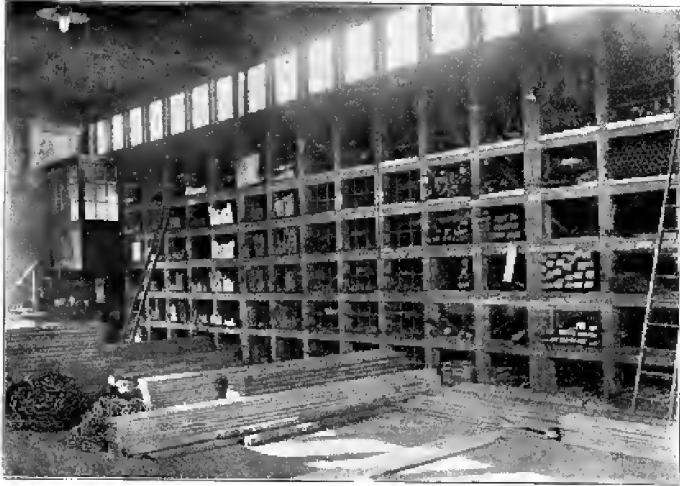
VIEW SHOWING TURNTABLE IN STOREHOUSE AT ANGUS SHOPS, C. P. RY.



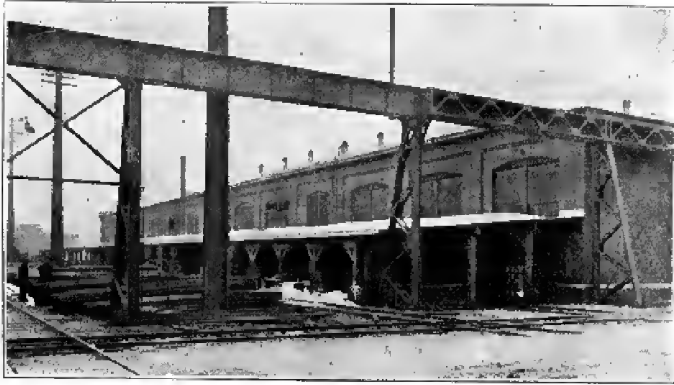
BRASS AND COPPER TUBE RACK IN STOREHOUSE, AT ANGUS SHOPS, C. P. RY.



BRASS ROOM IN STOREHOUSE AT ANGUS SHOPS, C. P. RY.



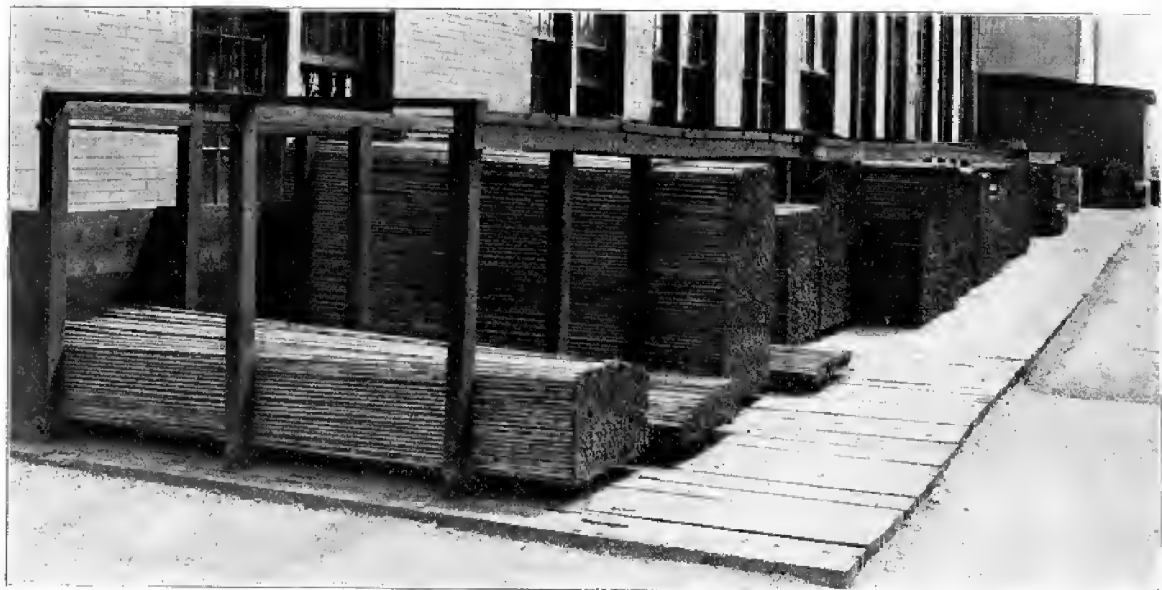
INTERIOR OF IRON HOUSE AT ANGUS, C. P. RY.



IRON SHED ADJACENT TO BLACKSMITH SHOP AT ANGUS, C. P. RY.



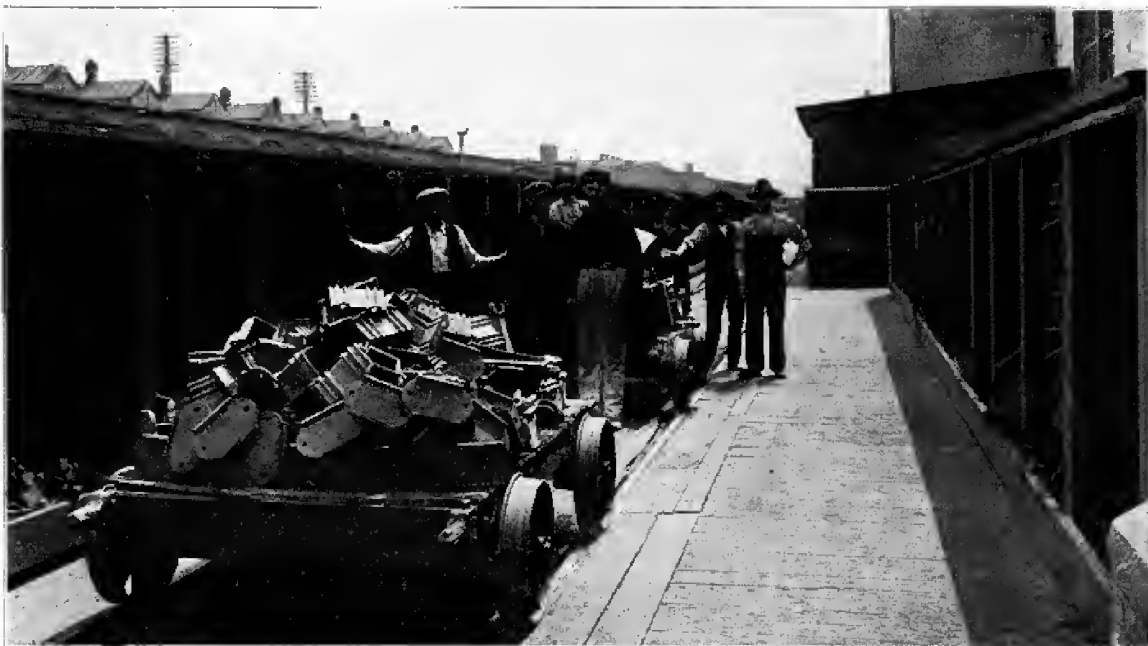
SYSTEM OF STORING BOLTS TEMPORARILY IN FREIGHT CAR ERECTING SHOP AT ANGUS, C. P. RY.



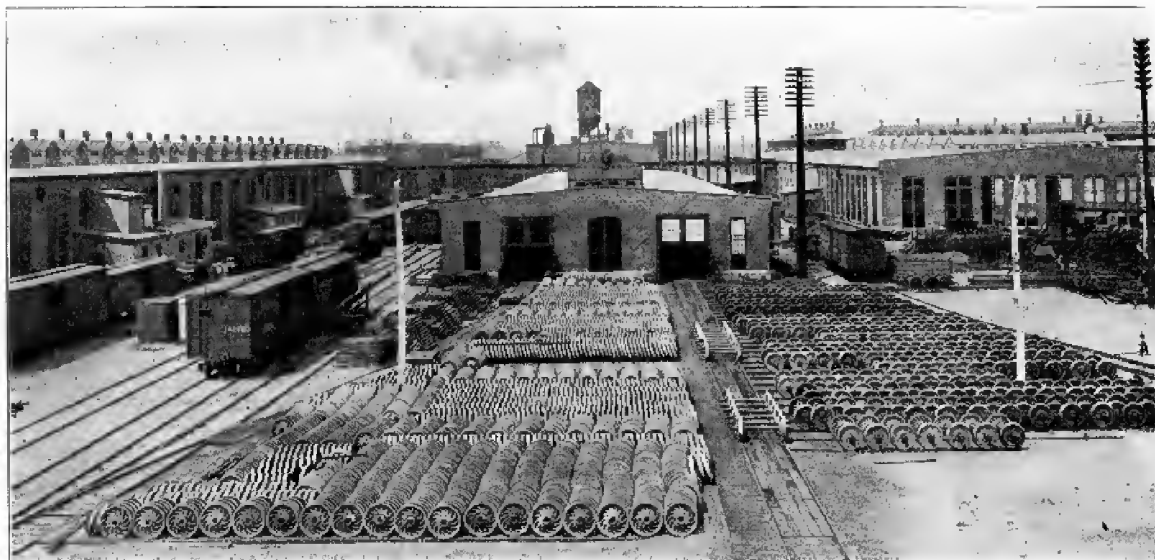
RACKS FOR STORING CAR BODY BRACE RODS AT ANGUS, C. P. RY.



CLASSIFIED BINS FOR STORING CAR CASTINGS ADJACENT TO FREIGHT CAR ERECTING SHOP AT ANGUS, C. P. RY.



METHOD OF TRANSFERRING CASTINGS ON STANDARD GAUGE INDUSTRIAL CARS AT ANGUS, C. P. RY.



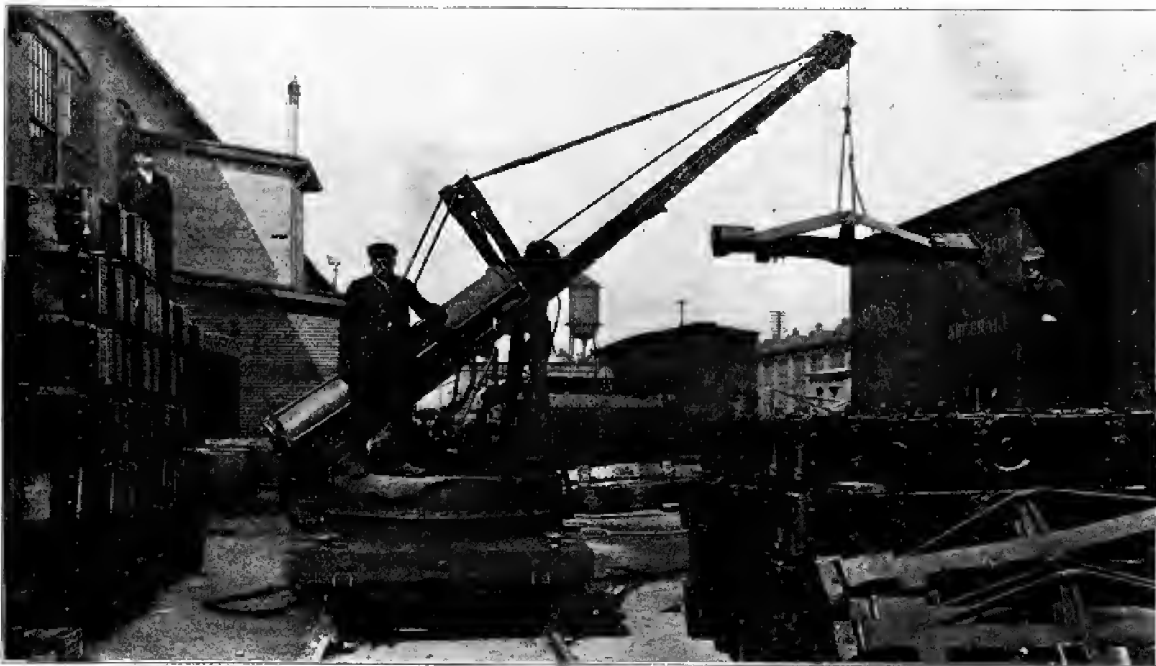
CAR WHEEL STORAGE YARD BETWEEN WHEEL FOUNDRY AND TRUCK SHOP AT ANGUS, C. P. RY.



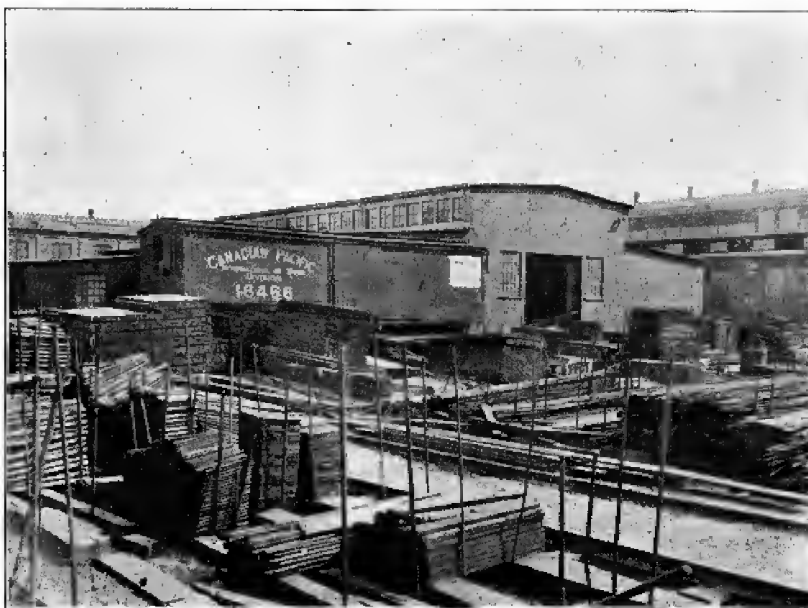
LUMBER YARD AT ANGUS, C. P. RY.



SCRAP PLATFORM AT ANGUS, C. P. RY.

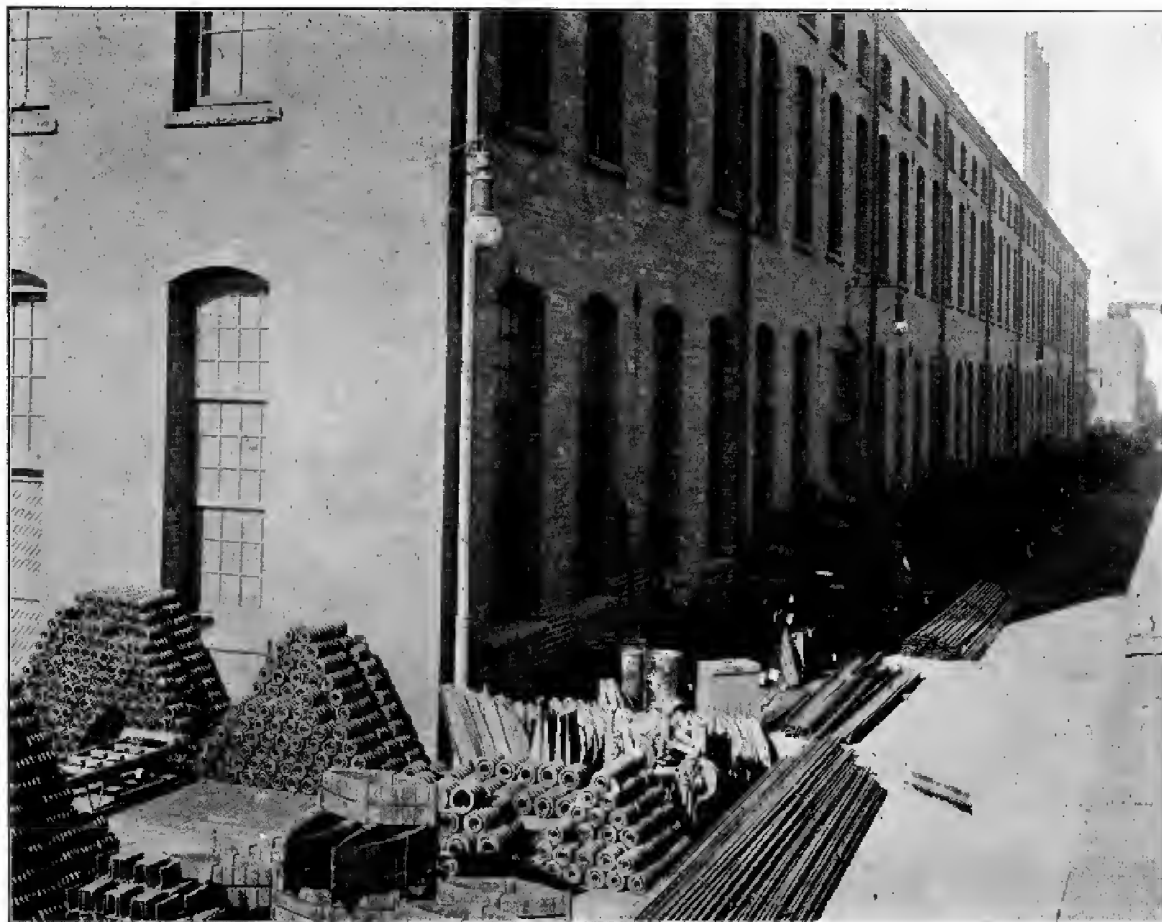


UNLOADING BOLSTERS IN STORAGE YARD ADJACENT TO TRUCK SHOP AT ANGUS, C. P. RY.



Railway Store Keepers' Association.

IRON STORAGE YARD AT ANGUS, C. P. RY.



Railway Store Keepers' Association.

EXTERIOR VIEW OF GENERAL STOREHOUSE AT COLLINWOOD, OHIO, L. S. & M. S. RY.



Railway Store Keepers' Association.

SIX UNITS OF SECTIONAL, INTERCHANGEABLE SHELVES.



Railway Store Keepers' Association.

SIX UNITS OF SECTIONAL, INTERCHANGEABLE SHELVES,
EACH UNIT DIVIDED INTO FOUR PARTS.



Railway Store Keepers' Association.

METHOD OF STORING MATERIAL ON FIRST FLOOR OF GENERAL STOREHOUSE AT COLLINWOOD, O.,
L. S. & M. S. RY.



Railway Store Keepers' Association.

METHOD OF SUB-DIVIDING UNITS OF SECTIONAL, INTER-CHANGEABLE SHELVES.



Railway Store Keepers' Association.

METHOD OF SUB-DIVIDING UNITS OF SECTIONAL, INTER-CHANGEABLE SHELVES.

RAILWAY SHOP UP TO DATE

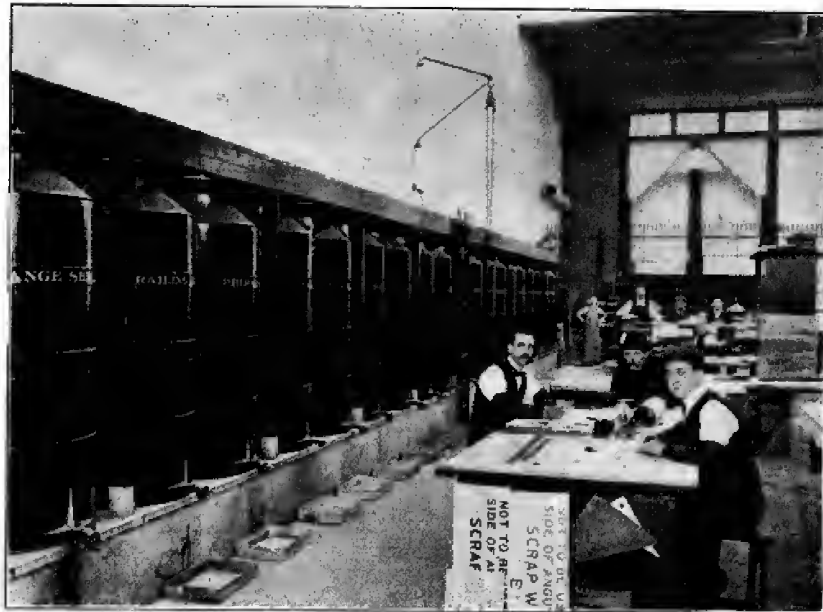


WAGONS FOR TRANSPORTING BOLTS IN BULK AT COLLINWOOD SHOPS., L. S. & M. S. RY.



Railway Store Keepers' Association.

RETAIL ROOM IN GENERAL STOREHOUSE AT COLLINWOOD, O., L. S. & M. S. RY.



PAINT STOCK ROOM AT ANGUS, C. P. RY.



Railway Store Keepers' Association.

ARRANGEMENT OF STORAGE SHELVES IN GENERAL STOREHOUSE AT COLLINWOOD, O., L. S. & M. S. RY.



Railway Store Keepers' Association.

CASTING PLATFORM OF GENERAL STOREHOUSE AT COLLINWOOD, O., L. S. & M. S. RY.



Railway Store Keepers' Association.

MATERIAL YARD OF COLLINWOOD SHOPS, L. S. & M. S. RY.



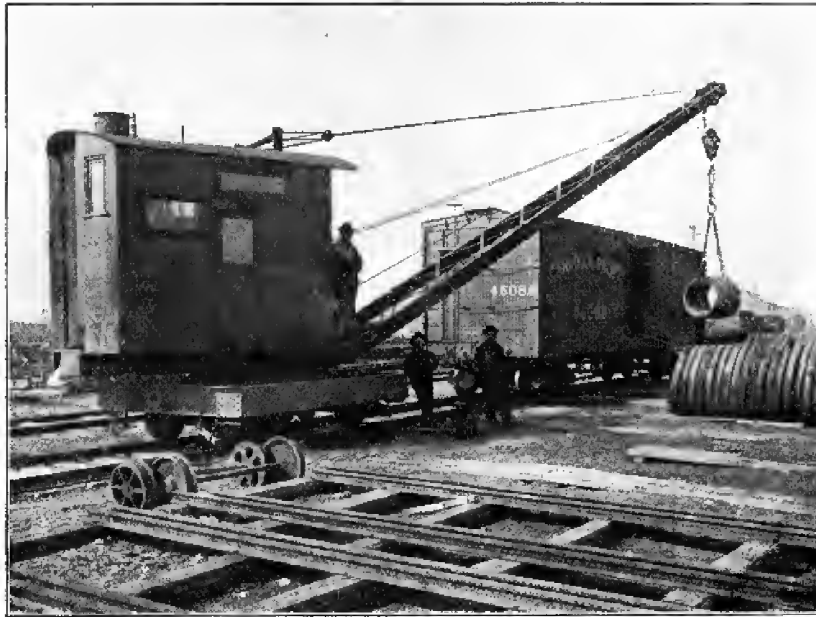
Railway Store Keepers' Association.

METHOD OF STORING MATERIAL AND SUPPLIES FOR LOCOMOTIVES IN GENERAL STOREHOUSE AT
WEST ALBANY, N. Y., N. Y. C. & H. R. R. R.



Railway Store Keepers' Association.

CASTING PLATFORM OF GENERAL STOREHOUSE AT WEST ALBANY, N. Y., N. Y. C. & H. R. R. R.



Railway Store Keepers' Association.

CRANE USED IN STORAGE YARD AT ANGUS SHOPS, C. P. RY.



Railway Store Keepers' Association.

SCRAP PLATFORM AT WEST ALBANY SHOPS, N. Y. C. & H. R. R. R.